

REMARKS

This Amendment, in connection with the following remarks, is submitted as fully responsive to the Final Office Action. Claims 13-28 are pending. Applicant has amended claims 13, 14 and 16 to further clarify the claimed invention. Claims 13 and 28 are the independent claims. Favorable reconsideration is requested.

Claims 13-28 stand rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement, and claims 13-28 stand rejected under 35 U.S.C. 112, second paragraph, as allegedly failing to comply with the enablement requirement.

Claims 13-28 stand rejected under 35 U.S.C. 101 allegedly because the claimed invention is directed to non-statutory subject matter.

For the reasons set forth below, Applicant respectfully traverses.

In the Final Office Action the enumerated 35 U.S.C. 101 rejections are, in actuality, identical to the two 35 U.S.C. 112 rejections. All of these rejections are based upon the Examiner's assertion that the claimed invention is "no more than a mathematical abstraction or algorithm," Final Office Action at 5, because "no computer hardware implementing said neural network is disclosed." *Id.* Similarly, in articulating the 35 U.S.C. 112 rejections, the Final Office Action states that the Examiner could find no disclosure of "a computer having a processor and memory." Final Office Action at 3-4 (paragraphs 5-6 of the Final Office Action).

As described below, it is inconceivable to implement the claimed neural network except in a digital computer or data processor. A person skilled in the art reading the Specification would immediately understand that fact, and would never even imagine that the claimed innovation is an abstract idea that could be implemented using pen and paper, or in any device that does not have a data processor and memory. In fact, the entire science of neural networks

grew out of, and remains solely within, the domains of artificial intelligence (“AI”), a sub-discipline of computer science, and digital signal processing. Thus artificial neural networks are often used in signal processing applications, such as edge detection or image recognition software.

In each and every known use of an artificial neural network, including those described in the references provided in the Specification, the given network is implemented on a digital computer. This knowledge is well within the knowledge base of a person skilled in the relevant art. “To satisfy the written description requirement, ‘the applicant does not have to utilize any particular form of disclosure to describe the subject matter claimed, but the description must clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed.’” *Carnegie Mellon Univ. v. Hoffmann La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *In re Alton*, 76 F.3d 1168, 1172 (Fed. Cir. 1996)). “In other words, the applicant must ‘convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,’ and demonstrate that by disclosure in the specification of the patent.” *Id.* 2008-1248 (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991)).

Thus, the Specification provides at ¶ [0004]-[0005]:

[0004] These kind of algorithm are the basis for improving the capabilities in carrying out automatically tasks without the help of human intelligence or intervention. Typically they are applied in robots or in highly intelligent systems for automatisation and allow to expand the use of machines with high reliance levels also in carrying out tasks which cannot be defined in terms of rigid data based on technical, physical, chemical parameters or the like.

[0005] From this point of view such kind of algorithm have a technical character and a technical effect, since the aim of these algorithm is to provide technical apparati, such as computers which compute data in a way similar to the way as this data would have been treated by the human brain by providing in a more simple way a structure which is conform to the known structure of the brain.

Accordingly, the data operated upon is stored in a database, in a computer memory:

[0068] X_i to X_n indicate the input values which are received by the node from other nodes i to n if the node belongs to a hidden layer or to the output layer or which are the input data of the database if the node belongs to the input layer. (emphasis supplied)

Finally, the Examiner's point regarding the two examples described in the Specification being only is, respectfully, not fully understood by Applicant. The Wisconsin Breast Cancer Database was used to tune each of a standard back propagation artificial neural network and a "Sine Node" neural network according to an exemplary embodiment of the present invention. After the appropriate training/tuning, each artificial neural network (*i.e.*, both the prior art back propagation type, and the novel type of the present invention) was used to make predictions. Specification at ¶¶ [0113] - [0116]. In every artificial neural network there is a training set of, *e.g.*, database records, used to tune the neural network, which neural network can then be used to generate outputs given inputs – *i.e.*, make predictions. Thus, 629 observations were used from the Wisconsin Breast Cancer Database to tune the neural network, and then the neural network's accuracy was tested by having it make predictions on 70 other observations from the same Wisconsin Breast Cancer Database. *Id.* at ¶ [0113].

Moreover, corroborating the various references in the Specification provided above, the Wisconsin Breast Cancer Database example makes clear that the artificial neural networks under discussion involve implementation on digital computers:

[0111] The network configuration were for Back-propagation network sigmoidal activation and Softmax function for the output nodes, one node for malignant class and one node for benignant. (see deeper detail in Mangasarian O. L. and Wolberg W. H., (1990), "Cancer diagnosis via linear programming", SIAM News, Volume 23, Number 5, September 1990, pp 1 & 18).

Specification at ¶ [0111] (emphasis supplied).

As is known in the art, Linear programming only occurs in the context of digital computers. Operating on a database requires having memory in which to store the database.

A similar approach to that used regarding the Wisconsin Breast Cancer Database was used regarding the Australian Credit Scoring database example, involving a data set concerning credit card applications. A comparison between a classic Back-propagation network “Bp” and the network according to the invention, “SN” was performed. Specification at ¶¶ [0122] – [0128]. The results are provided in Table 6 of the Specification.

The two provided examples are not a matter of machine learning, but rather illustrations that the novel artificial neural network – as implemented in a computer as in the normal fashion of all artificial neural networks – has greater accuracy than prior art versions, *i.e.*, back propagation type neural networks.

Both the Wisconsin Breast Cancer Database and the Australian Credit Scoring Database were obtained by the inventor from the Internet. Specification at ¶ [0105]. Thus, they were downloaded and stored on the computer(s) used to run the described examples.

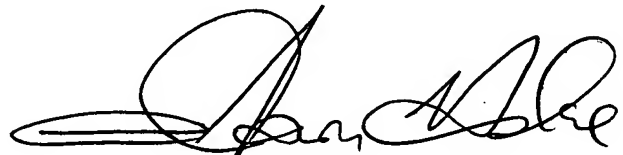
Given that the Specification clearly does disclose to anyone skilled in the art that the claimed invention is implemented in a digital computer – such as might be found in, *e.g.*, a robot or in highly intelligent systems for automation (*Specification* at [0005]), where the data is stored in a database (*Specification* at [0068]), and the neural network is implemented, for example, by programming said computer (*Specification* at [0111]), claim 38 does not contain any new matter, and the various rejections of claims 13-27 should be withdrawn.

Given that all prior art rejections have been removed, early passage to issue is requested.

Because it is critical to appreciate the digital computer context in which the claimed invention is described and claimed, Applicants will be contacting the Examiner in order to hold a personal interview with the Examiner and his supervisor to discuss this important issue *viva voce*, and demonstrate how one ordinary skilled in the art would understand the description contained in the Specification. Applicants thus reserve the right to file a Supplemental Amendment (including declarations, as may be appropriate) following such interview.

No fee is believed to be due with the filing of this Amendment and Response. However, if any fee is due, the Director is hereby authorized to charge any additional deficiencies or credit any overpayments to Deposit Account No. 50-0540.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Aaron Haleva', written over a horizontal line.

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